

CLAIMS

1. A composite comprising:
one or more first components selected from the group consisting of silica gel,
fumed silica, neutral clay, alkaline clay, zeolite, solid catalyst, alumina, adsorbent
polymer, and alkaline earth silicate hydrate;
intimately bound to one or more second components selected from the group
consisting of biogenic silica, natural glass, buoyant glass, buoyant polymer, and
cellulose.
2. The filterable composite adsorbent according to claim 1, wherein said functional
filtration component is a natural glass.
3. The filterable composite adsorbent according to claim 1, wherein said functional
filtration component is biogenic silica.
4. A filterable composite adsorbent comprising:
one or more adsorbent components selected from the group consisting of silica gel,
fumed silica, neutral clay, alkaline clay, zeolite, solid catalyst, alumina, adsorbent
polymer, and alkaline earth silicate hydrate;
intimately bound to one or more functional filtration components selected from the
group consisting of diatomite, rice hull ash, sponge spicules, expanded perlite, pumice,
expanded pumice, pumicite, expanded obsidian, expanded volcanic ash, natural glass,
buoyant glass, buoyant polymer, and cellulose.
5. The filterable composite adsorbent according to claim 4, wherein said adsorbent
component is selected from the group consisting of silica gel and fumed silica.
6. The filterable composite adsorbent according to claim 4, wherein said adsorbent
component is selected from the group consisting of neutral clays and alkaline clays.

7. The filterable composite adsorbent according to claim 4, wherein said adsorbent component is selected from the group consisting of zeolite, alumina, and alkaline earth silicate hydrate.
- 5 8. The filterable composite adsorbent according to claim 4, wherein said functional filtration component is diatomite.
9. The filterable composite adsorbent according to claim 4, wherein said functional filtration component is rice hull ash.
- 10 10. The filterable composite adsorbent according to claim 4, wherein said functional filtration component is sponge spicules.
11. The filterable composite adsorbent according to claim 4, wherein said functional filtration component is a selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
- 15 12. The filterable composite adsorbent according to claim 4, wherein said functional filtration component is expanded perlite.
- 20 13. A filterable composite adsorbent comprising silica gel intimately bound to biogenic silica.
- 25 14. A filterable composite adsorbent comprising silica gel intimately bound to a natural glass.
15. A filterable composite adsorbent comprising silica gel intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.

16. A filterable composite adsorbent comprising silica gel intimately bound to expanded perlite.
- 5 17. A filterable composite adsorbent comprising fumed silica intimately bound to biogenic silica.
18. A filterable composite adsorbent comprising fumed silica intimately bound to a natural glass.
- 10 19. A filterable composite adsorbent comprising fumed silica intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
- 15 20. A filterable composite adsorbent comprising fumed silica intimately bound to expanded perlite.
21. A filterable composite adsorbent comprising neutral clay or alkaline clay intimately bound to biogenic silica.
- 20 22. A filterable composite adsorbent comprising neutral clay or alkaline clay intimately bound to a natural glass.
- 25 23. A filterable composite adsorbent comprising neutral clay or alkaline clay intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
24. A filterable composite adsorbent comprising neutral clay or alkaline clay intimately bound to expanded perlite.
- 30 25. A filterable composite adsorbent comprising zeolite intimately bound to biogenic silica.
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26. A filterable composite adsorbent comprising zeolite intimately bound to a natural glass.
- 5 27. A filterable composite adsorbent comprising zeolite intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
- 10 28. A filterable composite adsorbent comprising zeolite intimately bound to expanded perlite.
29. A filterable composite adsorbent comprising alumina intimately bound to biogenic silica.
- 15 30. A filterable composite adsorbent comprising alumina intimately bound to a natural glass.
31. A filterable composite adsorbent comprising alumina intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
- 20 32. A filterable composite adsorbent comprising alumina intimately bound to expanded perlite.
- 25 33. A filterable composite adsorbent comprising adsorbent polymer intimately bound to biogenic silica.
34. A filterable composite adsorbent comprising adsorbent polymer intimately bound to a natural glass.

35. A filterable composite adsorbent comprising adsorbent polymer intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
- 5 36. A filterable composite adsorbent comprising adsorbent polymer intimately bound to expanded perlite.
37. A filterable composite adsorbent comprising alkaline earth silicate hydrate intimately bound to biogenic silica.
- 10 38. A filterable composite adsorbent comprising alkaline earth silicate hydrate intimately bound to a natural glass.
- 15 39. A filterable composite adsorbent comprising alkaline earth silicate hydrate intimately bound to a material selected from the group consisting of expanded perlite, pumice, expanded pumice, pumicite, expanded obsidian, and expanded volcanic ash.
40. A filterable composite adsorbent comprising alkaline earth silicate hydrate intimately bound to expanded perlite.
- 20 41. The composite according to claim 1, wherein
the permeability of said composite is greater than the permeability of a simple mixture of said one or more first components and said one or more second components,
25 wherein the proportions of said one or more first components and said one or more second components in said simple mixture are identical to those used in the preparation of said composite.
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42. The composite according to claim 1, wherein

the permeability of said composite is at least 5% greater than the permeability of a simple mixture of said one or more first components and said one or more second components,

5 wherein the proportions of said one or more first components and said one or more second components in said simple mixture are identical to those used in the preparation of said composite.

43. The composite according to claim 1, wherein

10 the median particle diameter of said composite is greater than the median particle diameter of a simple mixture of said one or more first components and said one or more second components,

15 wherein the proportions of said one or more first components and said one or more second components in said simple mixture are identical to those used in the preparation of said composite.

44. The composite according to claim 1, wherein

20 the median particle diameter of said composite is at least 5% greater than the median particle diameter of a simple mixture of said one or more first components and said one or more second components,

wherein the proportions of said one or more first components and said one or more second components in said simple mixture are identical to those used in the preparation of said composite.

25 45. The composite according to claim 1, wherein each of said one or more second components has a permeability of 0.001 to 1000 Da.

46. The composite according to claim 1, wherein said composite is prepared using a stationary bed furnace or a rotary kiln furnace.

47. The composite according to claim 1, wherein said composite is in the form of a powder, a sheet, a pad, or a cartridge.
48. The composite according to claim 1, wherein said composite is thermally sintered and/or chemically bonded in the form of a rigid shape.
49. The composite according to claim 1, wherein said composite is in the form of a monolithic support, an aggregate support, a monolithic substrate, or an aggregate substrate.
50. A method of adsorption and filtration comprising the step of (i) suspending a filterable composite adsorbent according to claim 4 in a fluid containing suspended particulates or constituents to be adsorbed, followed by the step of (ii) separating said filterable composite adsorbent from said fluid.
51. A method of adsorption and filtration comprising the step of (i) suspending a filterable composite adsorbent according to claim 4 in a fluid containing suspended particulates or constituents to be adsorbed, followed by the step of (ii) passing said fluid with suspended filterable composite adsorbent through a filterable composite adsorbent according to claim 4 supported on a septum.
52. A method of adsorption and filtration comprising the step of passing a fluid containing suspended particles or constituents to be adsorbed through a filterable composite adsorbent according to claim 4 which is supported on a septum.
53. A method of adsorption and filtration comprising the step of passing a fluid containing suspended particles or constituents to be adsorbed through a filterable composite adsorbent according to claim 4 which is in the form of a rigid shape.
54. A method of adsorption and filtration according to claim 50, wherein said fluid is a liquid, a molten solid, or a gas.

55. A method of adsorption and filtration according to claim 51, wherein said fluid is a liquid, a molten solid, or a gas.
- 5 56. A method of adsorption and filtration according to claim 52, wherein said fluid is a liquid, a molten solid, or a gas.
57. A method of adsorption and filtration according to claim 53, wherein said fluid is a liquid, a molten solid, or a gas.
- 10 58. A method for the preparation of a filterable composite adsorbent according to claim 4, said method comprising the steps of (i) blending one or more adsorbent components with one or more functional filtration components, and (ii) applying microwave radiation applied to the blend, thereby forming said filterable composite adsorbent.